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(54) **Connector for child safety seat**

(57) A tether strap and connector combination is connected between an upper part of the backrest of a safety seat and an anchorage location in a vehicle. The connector has a first connector part (24) adapted to be secured to the vehicle and a second connector part (26)

adapted to releasably engage with the first connector part (24). A tether strap (28) connects the second connector part (26) to the backrest. The second connector part (26) is attached to the tether strap (28) by energy-absorbing means (40, 49, 51).

**Fig.1.**

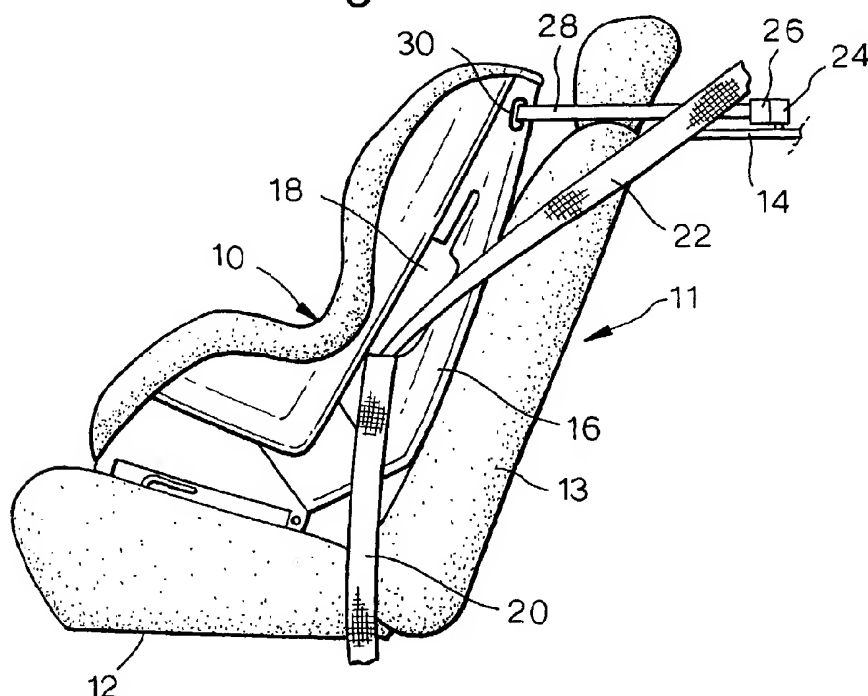
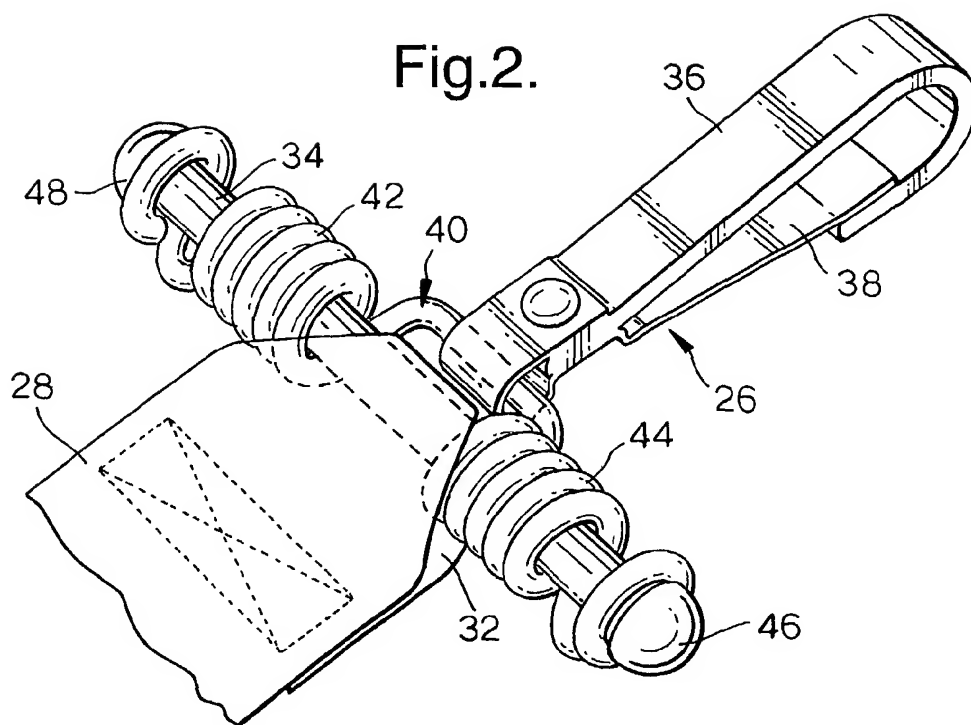


Fig.2.



## Description

[0001] This invention relates to a tether strap and connector combination for connection between an upper part of the backrest of a safety seat and an anchorage location in a vehicle, wherein the connector has a first connector part adapted to be secured to the vehicle and a second connector part adapted to releasably engage with the first connector part, and the tether strap connects the second connector part to the backrest.

[0002] A safety seat having a tether strap and connector combination of this type is disclosed in US-A-5630645.

[0003] The provision of a child safety seat with a tether of the type described above has proved successful in reducing the range of forward movement of the head of an occupant of a forward-facing seat in the event of an accident. However, it has also had the result of increasing the maximum acceleration to which the occupant's head is subject under these conditions.

[0004] According to one aspect of the invention, in tether strap and connector combination of the type described above, the second connector part is attached to the tether strap by energy-absorbing means.

[0005] Several energy-absorbers for use with a vehicle seat belt are disclosed in WO-A-9737876. One of these comprises a wire wound in a helix round an elongate rod. An applied load tends to straighten the helix.

[0006] Embodiments of the invention will now be described, by way of example, with reference to the accompanying drawings, in which:

Figure 1 is a side view of a safety seat in accordance with the invention in a forward-facing position on a vehicle seat;

Figure 2 is a perspective view of a first tether strap connector for use with the safety seat shown in Figure 1;

Figure 3 is a perspective view of a second tether strap connector for use with the seat shown in Figure 1; and

Figure 4 is a perspective view of a third tether strap connector for use with the safety seat shown in Figure 1.

[0007] Figure 1 shows a safety seat 10 resting on a vehicle seat 11 having a seat portion 12 and a backrest 13. A parcel shelf 14 is located behind the upper part of the backrest 13. The back of the safety seat 10 includes a pair of projecting beams 16 (only one of which is visible in the drawings) having an opening 18 for the lap strap 20 and shoulder strap 22 of a vehicle seat belt, by means of which the safety seat 10 is secured in place on the vehicle seat 12.

[0008] A two-part connector has a first part 24 secured to the parcel shelf 14, the second part 26 of the connector is attached to one end of a tether strap 28, the other end of which is secured to a slot 30 in the beam

16. The second part 26 of the connector may comprise a hook which engages in a slot in the first part 24, as described in CA-1301435.

[0009] Figure 2 shows the second part of the two-part connector in more detail. The rear end of the tether strap 28 has a loop 32 sewn therein. The loop 32 is positioned at a mid-point on a rigid metal rod 34. The second connector part 26 also has a hook 36 for engaging in a slot in the first connector part 24 (not shown in Figure 2) together with a leaf spring retainer 38 to hold the hook in its engaged position. The hook 36 is secured to the middle region 40 of a U-shaped member 40 which is formed from resilient steel wire or the like. Each limb 42, 44 of the U-shaped member is wound in a helix on a respective end of the rod 34. The loop 32 in the tether strap is located between the two helical limbs 42, 44. End caps 46 and 48 prevent the two helical limbs 42, 44 from sliding off the rod 34.

[0010] If the tether strap 28 is subject to a sudden jerk, for example in an accident, the wire of the helical limbs 42, 44 tend to straighten out, thus reducing the deceleration of the head and upper body of a child occupant of the seat 10.

[0011] Figure 3 shows a modification to the second connector part 26 shown in Figure 2. The central portion of a wire U-shaped member 49 is shaped to form an integral hook 50. Otherwise, the connector part is as described with reference to Figure 2.

[0012] Figure 4 illustrates a further variant, which the wire U-shaped member is replaced by a U-shaped member 51 formed from sheet material. As with the embodiment of Figure 3, the U-shaped member has two helical limbs 52 and 54, and a central part comprising an integrally formed hook 56. The hook 56 is provided with a leaf spring closure 58 secured by rivets 60.

[0013] The invention is also applicable to anchorages of the type described in EP Patent Application No. 02251462.4.

## Claims

1. A tether strap and connector combination for connection between on an upper part (30) of the backrest of a safety seat and an anchorage location in a vehicle, wherein the connector has a first connector part (24) adapted to be secured to the vehicle and a second connector part (26) adapted to releasably engage with the first connector part (24), and the tether strap (28) connects the second connector part (26) to the backrest, **characterised in that** the second connector part (26) is attached to the tether strap (28) by energy-absorbing means (40, 49, 51).
2. A tether strap and connector combination according to claim 1, wherein the energy-absorbing means comprises a curved deformable element (40, 49, 51) arranged so as to at least partially straighten

when a load is applied thereto.

3. A tether strap and connector combination according to claim 2, wherein a rod (34) extends through a loop (32) formed in the tether strap (28), the curved deformable element comprises a U-shaped deformable member (40, 49, 51) having one limb formed in a first helix (42, 52) round said rod (34) on one side of the loop (32) and another limb formed in a second helix (44, 54) round the rod (34) on the other side of the loop (32), and the second connector part (26) comprises a coupling formation (36, 50, 56) secured to the U-shaped member between the first helix (42, 52) and the second helix (44, 54) and adapted to engage with the first connector part (24). 5 10 15
4. A tether strap and connector combination according to claim 3, wherein the coupling formation (50, 56) is integral with the U-shaped member. 20
5. A tether strap and connector combination according to claim 3 or 4, wherein the U-shaped member (40, 49) is formed from wire. 25
6. A tether strap and connector combination according to claim 3 or 4, wherein the U-shaped member (51) is formed from sheet material. 30
7. A tether strap and connector combination according to any preceding claim, wherein the second connector part (26) comprises a hook (36, 50, 56) adapted to engage in an opening in the first connector part (24). 35 40
8. A safety seat for use in a vehicle comprising a seat portion (12), a backrest (13), and tether strap and connector combination according to any preceding claim, the tether strap (28) being secured to an anchorage location adjacent to an upper part of said backrest (13). 45 50 55

Fig.1.

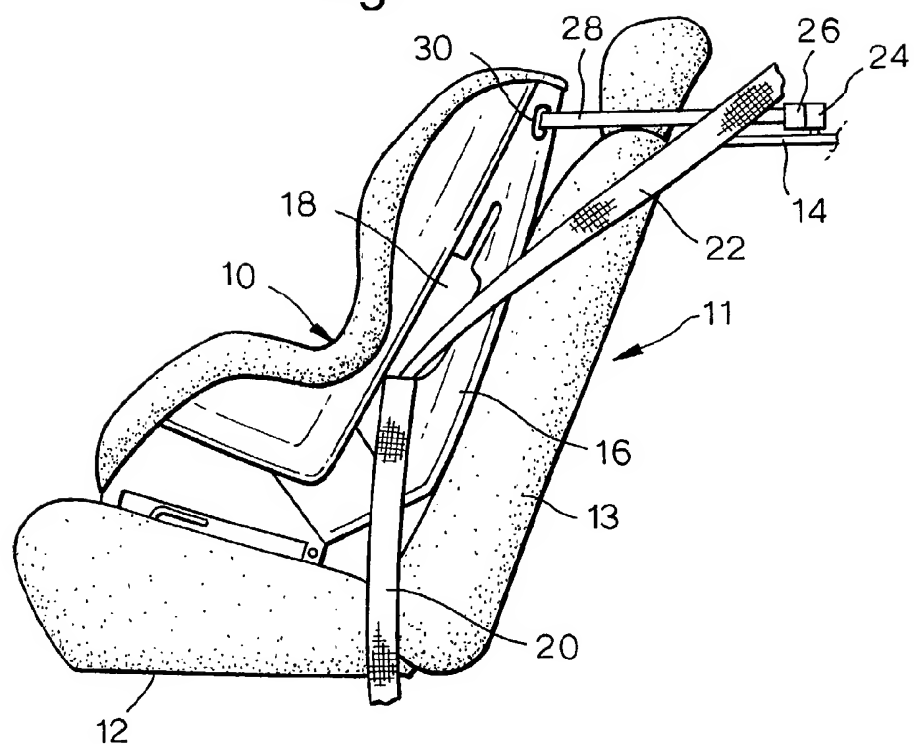


Fig.2.

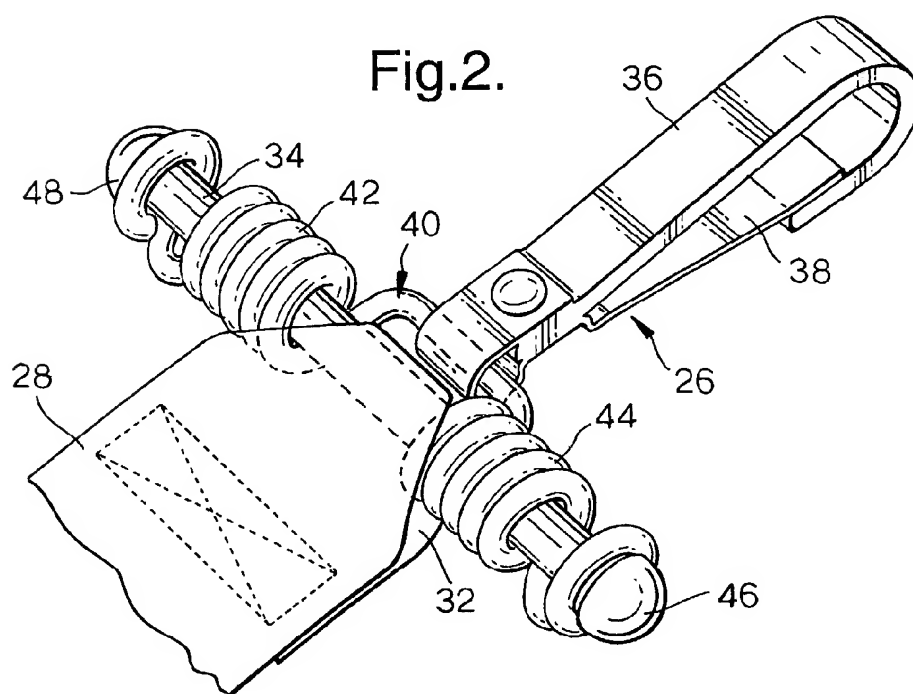


Fig.3.

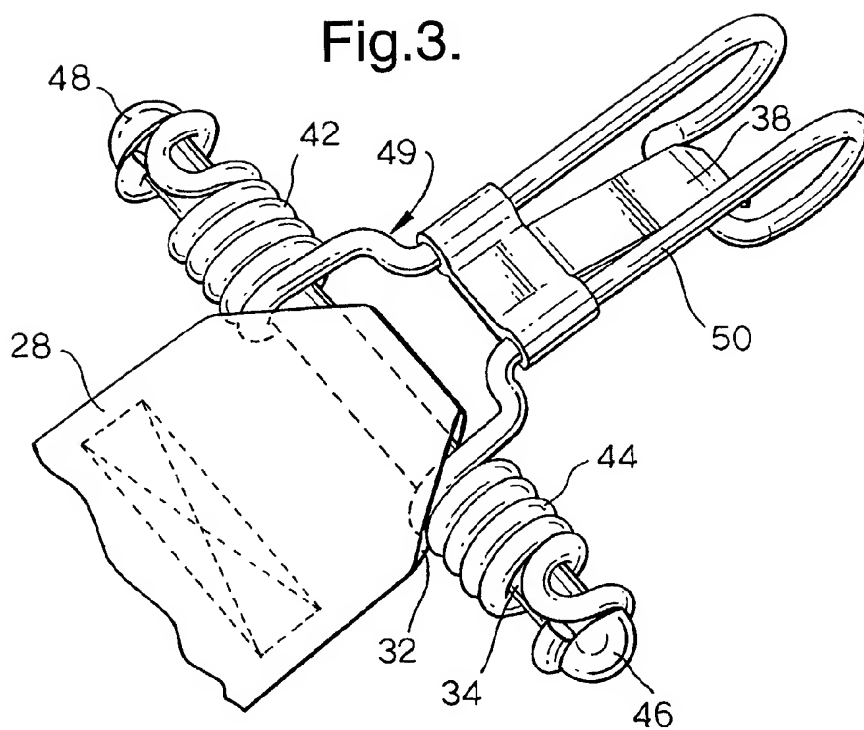


Fig.4.

